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ABSTRACT

Computer assisted career guidance (CACG) systems and other computer applications are becoming established components of counseling and guidance services. While technical details involved in software and hardware operations are usually attended to, problems resulting from interpersonal dynamics in the implementation process often contribute more to implementation difficulties than problems resulting from technological malfunction. This monograph presents an overview of computer applications in counseling, discusses typical problems associated with the implementation process, and describes the types of systems found in various settings. The interpersonal dynamics involved in organizational change are reviewed. Based on this discussion, a comprehensive model for implementing CACG systems and other computer applications is presented. Phases involved in this model are described including planning; staff training; trial; and operation, evaluation and refinement. The monograph concludes with a discussion of future perspectives regarding computer technology. (Author/MCF)

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IMPLEMENTING COMPUTER ASSISTED CAREER GUIDANCE AND OTHER COMPUTER APPLICATIONS FOR THE ADULT LEARNER

James P. Sampson, Jr., Michael Shahnasarian, and E. Nick Maddox

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CG 017659

To our wives, Sandy, Jeannie, and Marly, whose kind understanding and support made this monograph possible.

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The Counselor Training Component of Project LEARN is cooperatively engaged with the Council for the Advancement of Experiential Learning (CAEL), in providing training experiences for counselors, administrators, and other educators in the effective use of computer technology in services for the adult learner. Staff members for the Counselor Training Component of Project LEARN include:

Cynthia S. Johnson, Director
K Richard Pyle, Associate Director
Bruce Riesenberg, Regional Director
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ABSTRACT

Computer assisted career guidance (CACG) systems and other computer applications are becoming established components of counseling and guidance services. While technical details involved in software and hardware operations are usually attended to, problems resulting from interpersonal dynamics in the implementation process often contribute more to implementation difficulties than problems resulting from technological malfunction.

The authors of this monograph present an overview of computer applications in counseling, discuss typical problems associated with the implementation process, and describe the types of systems found in various settings. The interpersonal dynamics involved in organizational change are reviewed. This discussion then becomes the basis for a comprehensive model for implementing CACG systems and other computer applications. Phases involved in this model include planning; staff training; trial; and operation, evaluation, and refinement. The monograph concludes with a discussion of future perspectives regarding computer technology.

INTRODUCTION

A colleague of mine once described ERIC/CAPS as a "place that helps you make better choices." I like that definition. We can help people obtain a great deal of information on a large number of topics relevant to counseling and the human services. Many times, we can provide more information than the person wants or needs. What most of us really want is assistance in making decisions and obtaining the type of information which will help us choose from a variety of alternatives. Sometimes these alternatives are very attractive, and on other occasions, they all may be quite unappealing. In either case, choosing procedures and practices or arriving at a better understanding of concepts is something for which we at CAPS like to be considered a major resource.

Recently, one of the most frequent requests we have received is for assistance in making choices about computers in counseling: "Should we purchase a microcomputer for our counseling program?" "Is there really useful software available in the counseling area?" "Should we install a computer-assisted career counseling program?" "How can we deal with staff resistance to the idea of computers and technology in the area of counseling and human services?" These questions mirror the ongoing concern by active, professional human services specialists for ways to implement technological innovations into existing programs. The hype for this or that piece of hardware or software program is frequently great. Objective and reliable information is limited. Therefore, at CAPS we have identified as a major priority the preparation of materials and resources which are useful to counselors and human services specialists in making informed and appropriate choices regarding computers and technology. This publication represents another one of the outcomes of our efforts to take the mystery and the confusion out of such choices.

We are particularly pleased that the authors of this monograph have not only reviewed the available systems but also given consideration to the important human factors involved in using computers, and especially to the leadership role that counselors and human services specialists can play in bringing about program change. The authors' discussion of the process by which computers can be implemented into a program and their remarks about the future will prove, we believe, to be useful to all readers.

The monograph also represents an outcome of our collaboration with a counselor training component of Project LEARN. We believe that there is much to be gained by active cooperation with major professional associations and cutting edge projects. We are hopeful that readers will find this publication useful in increasing their knowledge and in helping them chart the narrow path between unbridled enthusiasm and mindless negativism toward the use of computers in counseling and human services. We welcome your comments both about this monograph and about others you would like to see ERIC/CAPS develop.

Garry R. Walz

PREFACE

Implementing a computer-assisted counseling and student development system can appear to be an overwhelming task. A wide variety of information gathering, decision making, and human relationship skills is required. The existing literature on computer applications in counseling emphasizes either descriptions of systems or research and evaluation studies. While these contributions to the literature provide information that is relevant to the implementation process, we need to integrate our knowledge of existing computer applications in counseling with experience gained from implementing computer systems in a variety of instructional and human service settings.

This monograph provides a detailed guide to the process of successfully implementing computer applications in counseling and student development. Chapter 1 presents an overview of computer applications in counseling as well as typical problems associated with the implementation process. An overview of present computer applications in a variety of settings is provided in Chapter 2. Chapter 3 explores the dynamics of change. Chapter 4 outlines a detailed model of the implementation process. The monograph concludes with a discussion of future perspectives in Chapter 5.

We would like to acknowledge the encouragement and support of Cynthia S. Johnson in the development of this monograph. We would also like to express our appreciation to Robert C. Reardon for his editorial comments on an early version of the manuscript. Finally, we would like to thank Barbara Appleyard for her assistance in typing the manuscript.

Chapter I
OVERVIEW

Over the past decade the nature of counseling and student development services has evolved in response to emerging needs and resources. Two particularly significant developments have been a growing commitment to serve the adult learner and a willingness to use computer technology to enhance the delivery of services.

Education is no longer seen as appropriate only for children and young adults. Older adults are requesting, and institutions are slowly providing, educational experiences that are designed to meet the ongoing needs of adult learners. This situation exists, at least in part, as a result of rapid changes in the family and the world of work. Adults view education as a source for obtaining the knowledge and skills necessary for effective adaptation to change. Counseling and student development services contribute to the developmental process by helping adult learners to identify and plan for educational experiences that are congruent with their goals. These services also assist adult learners to identify and eliminate personal, social and academic barriers to their growth.

A second important development is the expanded role of computers in providing counseling and student development services. This growth is attributable to the increased public acceptance of computer technology as a part of daily life, a reduction in the cost and complexity of computing activities due to the introduction of the microcomputer, the availability of a wide variety of relatively easy to use microcomputer software, and the emergence of a body of research and evaluation literature that generally validates the effectiveness of computer applications in this field.

The two trends described above have converged with the provision of computer assisted counseling and developmental services for the adult learner. Computer assisted applications are now used in career guidance, testing and assessment, study skills and personal counseling. While a few of these systems are designed specifically for adults, the major target group has been young adults. In an effort to accommodate the unique needs and perspectives of older adult learners, specific systems are now being developed for this population.

Inappropriate implementation of computer assisted counseling and student development services can severely limit their effectiveness--factors such as poor planning, inadequate staff training, and staff resistance to change. This monograph is intended to facilitate the implementation process by providing an overview of present systems, a general discussion of change, and a specific model for implementing computer applications.

Computer Assisted Career Guidance (CACG) systems are the most common type of application used by adult learners. As a result, this monograph emphasizes CACG systems. The dynamics associated with the change process and the implementation model presented in this document are, however, also appropriate for other types of computer applications.

CACG system interactions appear to facilitate constructive career decision making. Indeed, much of the popularity associated with automated guidance systems can be attributed to their effectiveness in meeting the guidance needs of users. System interaction often moderates the degree to which computer assisted guidance systems are useful. In many cases, problems with such systems are a result of poor implementation efforts and system management.

The Need for Implementation Strategies

The importance of precise system implementation cannot be overstated. Deriving positive potential user outcomes is directly related to proper implementation. Sampson (in press) states that:

> Implementation of computer applications involves a sequential process of revising or adding strategies to utilize computer technology within an organization for the purpose of meeting needs in a more effective manner. Implementation efforts are dynamic in that the process, once initiated, consists of a continual series of modifications in the manner in which technology and the needs of the user evolve and interact. (p. 5)

Factors associated with deficient implementation efforts are well documented. Among the most common factors assumed to be significant in limiting the effectiveness of implementation efforts are: (1) failure to include staff members in the process of making system-related decisions (Sheingold, Kane, Endreweit, &

Billings, 1981); (2) neglecting issues associated with staff resistance to the change process (Sampson, in press); anxiety related to procedural change (Kiresuk, Davis, & Lund, 1980) as well as anxiety related to the use of computer technology (Jay, 1981); (3) problems with inadequate staff communication (Johnson & Williams, 1980); (4) inadequate staff training (Clyde, 1979); (5) inadequate needs assessment prior to system selection (Riesenberg, 1983); (6) lack of established standards of professional practice related to the use of computer applications (Johnson, 1983; Sampson, 1983; Schoech, 1982); (7) unrealistic expectations regarding the time required to effectively implement a system (Sampson, in press); and (8) lack of effective evaluation strategies for measuring outcomes associated with computer use (Sampson, in press). Byrnes and Johnson (1981) elaborate on implementation problems relating to staff resistance, including insufficient organizational preparation for change and failure to develop strategies to alleviate staff resistance.

The nature of the problems outlined above emphasizes the importance of attending to the interpersonal dynamics involved in the implementation of computer applications. Although organizations usually consider the technical details involved in software and hardware operation, they often neglect interpersonal dynamics which are critical to effective system operation. Remedial attempts to correct problems resulting from poor system implementation are at best palliative. A systematic and comprehensive implementation strategy is essential to deriving the positive user outcomes that can be realized with CACG systems.

History of Computer Assisted Guidance Systems

Legislative acts, professional organizations, and individual pioneering efforts have historically been significant forces in the development of counseling interventions. The introduction and success of new, more sophisticated interventions are inevitably related to the implementation strategies that counselors use. Presented below is a synopsis of historical events related to the development of computer assisted career guidance and other computer applications. A comprehensive discussion of the relationship among historical events, occupational information resources and career guidance services resulting from these events, and issues related to implementing ensuing interventions is beyond the scope of this monograph. Readers will find extensive references for further study of these issues.

Since the inception of vocational guidance in 1909 (Parsons, 1909) both academic and practitioner-oriented counselors have been active in developing and refining career guidance interventions. Many of these efforts emphasized improved provision of occupational information and career guidance. Table 1 presents several examples of recent developments in occupational information and career guidance that have contributed to the breadth and scope of services that career counselors are able to provide. McDaniels (1982) reviewed other developments, and Sampson (1983) suggested an integrated model of computer applications in counseling psychology.

Table 1

Examples of Recent Advances in the State of Occupational Information and Career Guidance

Source of Contribution	Selected Examples
Multimedia applications	Films, filmstrips, microfiche, audiotapes, videotapes
Computer applications	Computer assisted career guidance, computer assisted assessment and testing, placement systems, career library indexing systems
Integration of multimedia and computer applications	Interactive videodisk technology

The introduction of computer technology to the counseling domain often has a significant impact on methods of disseminating career information and providing career guidance. Applications of computer technology currently assist counselors with a range of guidance functions, including providing information, providing instruction in decision making, and assisting in assessment activities.

A publication of the U.S. Department of Health, Education and Welfare (1969) described early events contributing to the development of computer based vocational guidance systems. The major legislation relating to computer guidance was identified by Jacobson and Grabowski (1982) and Snipes and McDaniels (1981). Maze

and Cummings (1982) presented a historical overview of the development of eight computer assisted guidance systems.

The National Defense Education Act (NDEA) in 1958 may well have been the legislation most influential in improving occupational information and career guidance services. Funding provided through this legislation allowed for the development of alternative guidance media, including film, audiotape, and videotape (McDaniels, 1982). Materials designed for special groups also began to emerge subsequent to the passage of the NDEA.

In 1963, the Vocational Education Act (VEA) contributed to the development of computer assisted guidance systems by confirming the determination of the United States government to make vocational education available to persons in all communities and to prepare individuals for gainful employment (Jacobson & Grabowski, 1982).

Tiedeman and his associates (Tiedeman, 1966) undertook an early attempt to automate guidance services in developing the Information System for Vocational Decisions (ISVD). Detailed descriptions of the ISVD were provided by Ellis and Tiedeman (1968) and Impelleteri (1968). The U.S. Department of Health, Education and Welfare publication (1969) reviewed other pioneering efforts which occurred in the 1960s. Super and Minor developed the Education and Career Exploration System (ECES) through funding from IBM in 1966. Katz of the Educational Testing Service began work on the System of Interactive Guidance and Information (SIGI) around 1966. The Computerized Vocational Information System (CVIS) was also developed by Harris during this period.

A series of legislative acts further contributed to the evolution of computer based guidance. The Educational Amendments Act of 1968 provided additional funding for career guidance programs. Amendments to the VEA in 1968 broadened the nature of the initial 1963 legislation (Drier & Herr, 1978). These amendments expanded the concept of guidance and counseling to include services stimulating job choices and job placement, and promoted the concept of the applicability of lifelong guidance services. In 1970 the U.S. Department of Labor awarded grants to eight states to develop occupational information services to students and out-of-school youth (Jacobson & Grabowski, 1982). The Comprehensive Employment and Training Act (CETA) passed in 1973 encouraged more direct counseling and information services for adults.

In the early 1970s professional organizations became active in directing computer assisted guidance applications. A commission appointed by the National Vocational Guidance Association was established in 1971 to study and set ethical guidelines for computer-based guidance systems. The National Occupational Information Coordinating Committee (NOICC) was organized in 1976 to facilitate interagency cooperation among the Education and Training Administration, the U.S. Bureau of Labor Statistics, the U.S. Office of Education, and the National Center for Educational Statistics in the development of occupational information systems. The objectives of the occupational information systems were to promote the development of computerized career information delivery systems as well as a systematic guidance process for individuals with career concerns (Snipes & McDaniels, 1981). Other legislation significant in the evolution of computer guidance systems included the Educational Amendments of 1976, the Youth Employment and Demonstration Projects Act (YEDPA) of 1977, the Career Education Incentive Act of 1977, and the Labor Market Information and Job Bank Program established in 1978. Drier and Herr (1978) presented a comprehensive review of counseling and guidance related legislation.

Developmental changes in the design of computer assisted guidance systems are discussed in Chapter 2.

Need for Computer Assisted Guidance Systems

Improving methods of providing effective and efficient guidance services is an ongoing concern of the guidance profession. Both guidance professionals and professional associations have elaborated desirable characteristics of career guidance programming. Herr and Cramer (1979) and Tolbert (1980) suggested that career guidance involves the systematic provision of sets of experiences designed to assist individuals in developing self-understanding, knowledge of the world of work, experience which can be utilized in the decision-making process, and identification of appropriate training and employment options.

The American Vocational Association and the National Vocational Guidance Association specified five career development elements that merit consideration in the planning of career guidance programs.

1. Self-understanding which includes a person's relationship to his/her own characteristics and perceptions and his/her relationship to others and the environment.

2. Understanding of the work society and those factors that affect its constant change, including worker attitudes and discipline.

3. Awareness of the part leisure time may play in a person's life.

4. Understanding of the necessity for and the multitude of factors to be considered in career planning.

5. Understanding of the information and skills necessary to achieve self-fulfillment in work and leisure (American Vocational Association, 1973, p. 6).

The broad goals associated with career guidance programming often place unrealistic demands on the time and breadth of knowledge required of guidance professionals. Computer technology facilitates career guidance programming efforts by using a systems approach in the delivery of occupational and educational information (Snipes & McDaniels, 1981). Computer assisted guidance systems capitalize on the capability of computers to process vast amounts of information in a short amount of time. Users interact with automated guidance systems to expand their self-awareness and acquire information relating to occupational and life style alternatives (Sampson, 1984). In addition to being able to store and retrieve vast amounts of information, the computer's data files can be manipulated in a variety of ways to meet the unique needs of the user.

Computers are not intended to eliminate the role that counselors assume in the career guidance process (Jacobson & Grabowski, 1982). Rather, computer assisted guidance systems operate in concert with counselors to provide services that computers and humans are most proficient at delivering. This complementary use of automation and human intervention enhances counselor effectiveness by eliminating routine information dissemination and other activities which are performed more efficiently by computers (e.g., data collection, storage, retrieval, statistical computations, actuarial predictions, repetitive instruction, clerical tasks), thereby allowing counselors more time to engage in helping activities that are performed best through human interaction (Harris, 1972; Sampson, 1983, 1984).

Harris-Bowlsbey (1983) maintained that computer assisted guidance systems have the capability to meet five areas of student guidance needs, including the capability to: (1) arouse awareness of a need to plan; (2) provide broad awareness of

alternatives; (3) teach a process of decision making; (4) provide recent easily accessible banks of information; and (5) provide systematic treatment with individualization.

Effectiveness of Computer Assisted Guidance Systems

Extensive reviews of CACG system research and evaluation studies were presented by Cairo (1983), Clyde (1979), Harris (1974), Parish, Rosenberg and Wilkinson (1979). In general, the literature suggests that after interacting with computer assisted guidance systems, users: (1) tend to rate the interaction favorably; (2) experience an increase in self-awareness and knowledge of specific occupations; (3) are more confident in their career decision making ability; and (4) are more motivated to utilize additional career related resources to provide futher assistance in the decision making process. Further research and evaluation studies are needed before these findings can be viewed as definitive. It is important to note that differential user outcomes are likely to result due to system differences (e.g., system goals, content, scope). Chapter 2 identifies several considerations which merit attention in the selection of a computer-based system.

Chapter 2
REVIEW OF PRESENT SYSTEMS

Three trends are emerging in computer assisted guidance applications: (1) Technological development and refinement of guidance systems continues to generate computerized applications capable of meeting individual needs; (2) Computerized applications of career guidance are extending to nonacademic settings; and (3) Large mainframes are being replaced by smaller, less expensive microcomputers.

This chapter reviews the types of computer assisted guidance systems available and some of the major settings in which automated systems may be found. Although computer assisted guidance systems were intially designed for students in educational settings, other organizations are beginning to adapt this technology to meet the career development needs of employees and to assist managers in activities associated with human resource management. Applications of computer assisted guidance can also be found in several other settings.

Types of Systems

The many variations and subtleties among computer assisted guidance systems necessitate a comprehensive classification scheme. An organized framework provides a systematic method for selecting a computer system based upon predetermined needs. Gaining an understanding of typological differences enables counselors to assist individuals in the selection of appropriate systems and facilitates the use of computerized guidance applications. Shatkin (1983a) suggested that each system differs in purpose, intended audience, content, structure, style, procedures for developing information, cost rationale, and models of guidance. These differences are likely to impact utilization outcomes.

One commonality among computerized systems relates to user utilization options. Shatkin (1982, 1983b) maintained that methods of accessing occupational information are similar among computer assisted guidance systems; users can obtain occupational information by direct access and by structured search. Direct access allows users to specify discrete information desired. Structured search procedures

help users select a set of desirable occupational characteristics. The computer then systematically searches its data files to match the specified characteristics and generates appropriate information.

Differences among computer assisted guidance systems have been acknowledged through several independent classification schemes. The criteria used to categorize various systems often change as technological developments modify computerized guidance applications.

An early classification scheme proposed by Harris (1973, 1974) focused on the nature of the user/computer interaction. Harris identified two major types of computer assisted guidance systems: indirect inquiry systems and direct inquiry systems.

Indirect Inquiry Systems

Indirect inquiry systems are those in which an individual seeks information from the computer's storage indirectly, i.e., the individual does not interact with computer hardware. Questionnaires are typically used to obtain information about the user's career preferences and priorities. Many of these questionnaires inquire about personal interests and values, such as the importance of earning a high salary.

Completed questionnaires are sent to a remote location and processed by a computer. Information matching an individual's specifications is generated on a computer printout and returned for analysis. This usage of computer assisted guidance is also referred to as batch processing. Indirect inquiry systems are characterized by: (1) delays in response to the user's inquiries; (2) a tendency for the user to use the system only once; (3) an unawareness by the user of the precise effects of options selected; and (4) a tendency for the user to receive incomplete information in response to inquiries.

Direct Inquiry Systems

Direct inquiry systems enable the user to interact directly with the computer. The user is able to type commands on a terminal keyboard, causing the computer to search, select, and relay information in printed form. Direct inquiry systems are characterized by: (1) immediate, interactive responses to inquiries; (2) a high degree of user control; (3) user awareness of causal relationships between responses entered and those generated by the computer; (4) potential for a high degree of personalization; and (5) options for the user to interact with selected sections of a system.

Most current classification schemes further circumscribe direct inquiry systems by focusing on qualitative differences involved in the computer/user interaction; computer assisted guidance systems tend to be categorized as information systems or guidance systems (Garis, 1982; Harris-Bowlsbey, 1983; Jacobson & Grabowski, 1982; Rayman & Harris-Bowlsbey, 1977; Sampson, 1983, 1984; Shahnasarian, in press).

Information Systems and Guidance Systems

Information systems identify appropriate career information. They do this by providing search strategies of large files, through the identification of options (occupations, colleges, military programs, financial aids), and the provision of extensive information about each of the options identified. Through extended interaction with an information system, users are likely to increase their understanding of causal relationships between information entered and career information correspondingly matched by the computer.

In addition to providing the information system functions, guidance systems provide users with an opportunity to obtain computer assisted guidance. Harris-Bowlsbey (1983) noted that computer assisted guidance systems can help the user to learn

> about the self in areas directly related to vocational choice (i.e., interests, abilities and values) in order to use this self-knowledge in identifying options ... It may also include the direct or indirect teaching of a decision-making process and interaction in topics such as organization of the world of work, values clarification, and job-seeking skills. (p. 11)

In general, guidance systems assist users in the career decision making process through a systematic approach, and may provide users with instruction in the career decision making process, assistance in the prediction of future success, assistance in developing future plans, and monitoring of progress (Sampson, 1984).

Examples of information systems include the Computerized Heuristic Occupational Information and Career Exploration System (CHOICES), Career Information System (CIS), Coordinated Occupational Information Network (COIN), Computerized Vocational Information System (CVIS), Educational and Career Exploration System (ECES), Guidance Information System (GIS), and Student Assessment and Deter-

mination Systems (Jacobson & Grabowski, 1982). The System of Interactive Guidance and Information (SIGI) and DISCOVER systems were identified as guidance systems by Garis (1982) and Katz and Shatkin (1980). Jacobson and Grabowski (1982) classified CHOICES along with SIGI and DISCOVER as guidance systems, while Harris and Tiedeman (1974) suggested that CVIS, ECES, SIGI, and DISCOVER have guidance (monitoring) capabilities. Comparative descriptions of several computer assisted guidance systems were provided by File (1983), Jacobson and Grabowski (1982), Katz and Shatkin (1980), Maze and Cummings (1982), and Shatkin (1980, 1983a).

Garis (1982) and Rayman and Harris-Bowlsbey (1977) suggested that the development of computerized guidance applications has occurred in generations, with batch processing systems representing a first generation, information systems representing a second generation, and guidance systems representing a current third generation. Future trends in the development of computer assisted guidance systems were discussed by Harris (1974), Johnson (1983), McDaniels (1982) and Sampson (1984). Computerized systems of the future are likely to be available to more individuals in a wide variety of settings.

Settings

Applications of computer technology to career guidance services originated in public school and higher education settings. Additional applications have expanded to meet the needs of adults in a variety of sites. This section overviews present computer assisted guidance systems in educational organizations, private business, and other environments. Table 2 presents several career development activities which may be facilitated through computer technology.

Educational Organizations

Goals common to all educational institutions are essentially twofold: (1) to propagate understanding and knowledge; and (2) to prepare students to enter the world of work. Advances in technology and system applications are occurring at a rate that makes an assessment of state-of-the-art developments in education almost impossible. The National Science Board Commission on Precollege Education in

Mathematics, Science, and Technology (1983) found that computers were being used in educational settings to develop computer literacy, improve student motivation, enhance rates of learning, provide assistance for teacher shortages and deficiencies, provide higher level instructional opportunities for disadvantaged and isolated students, improve administrative efficiency, and increase teacher efficiency. Computer assisted career guidance applications in educational settings allow students to explore the world of work through a systematic guidance format.

Table 2

Career Development Activities Which May be Facilitated Through Computer Technology

Activity	Special Applications
Assessment	Interest testing, performance appraisal, psychological testing, ability testing
Career Counseling	Occupational choice, preretirement counseling
Career Information	Career pathing, job posting, organizational resources, and organizational information (e.g., policies, training, and development activities, etc.)
Leisure Counseling	Choice of leisure activities
Organizational Career Planning	Maintaining background and skill inventories of employees, manpower planning
Training and Development	Job enrichment, supervisory, and skills training

In many educational settings, computer assisted guidance systems are an extension of counseling services. The popularity of computerized guidance among users appears to be increasing while administrators and academicians attempt to understand how this technology can be most efficaciously harnessed and utilized.

High school and college student populations were the first groups targeted by computer assisted guidance system developers (Sampson, 1984). A user survey conducted by McDaniels, Snipes, and Peevy in 1980 found that educational institutions were the predominant settings for computer guidance systems. A breakdown of nationwide high school and college utilization of computerized systems was presented by Chapman and Katz (1983).

Several researchers have suggested that automated systems can be effective in meeting the career guidance needs of young people (Chapman, Katz, Martin, Norris & Pears, 1977; Harris, 1972; McKinlay & Adams, 1971; Myers, Lindeman, Forrest, & Super, 1972; Rayman, Bryson & Bowlsbey, 1978). Rayman (1981) also recommended using computer assisted guidance systems to deliver career information and services to adult learners. Bartel (1984) outlined a career services program designed to attend to the needs of adult students. Rayman, Bryson and Day (1978) suggested that adult learners represent a special subset of students with unique problems, and that computerized career development programs can help them acquire essential skills in decision making, can provide essential information through a delivery method which is enjoyable to use, and can be both systematic and flexible to better fit the needs of individuals, as suggested by career development theory. The American College Testing Program and the Educational Testing Service are currently developing, with the assistance of the W. K. Kellogg Foundation through Project LEARN, computer assisted guidance systems designed to meet the specific needs of adults.

The computer's capabilities of processing vast amounts of information quickly and accurately, improving and increasing career guidance services, and providing systematic, individualized guidance are factors that contribute to the popularity of computer assisted guidance. The motivational appeal of computers for young people appears to invite students to interact with data files that can be used to generate objective yet personal occupational alternatives through a multitude of user-specified permutations. Harris-Bowlsbey (1983) suggested that computers provide a unique process for decision making in general or career decision making in particular. These guidance capabilities can be achieved by a didactic teaching model that "forces" the user through the model without direct instruction. The selection and ordering of specific content areas may serve indirectly to propose a model for making career decisions.

Automated systems designed to support career guidance are also in operation. Some career libraries use computers to assist students in accessing the cataloging records of occupationally related resources. Sampson (1982a) described the Computer Assisted Library Index (CALI), a microcomputer-based system that students can access directly. A similar system, entitled Career Key, was described by Smith (1983). Hoskins and Rosenthal (1983) discussed the use of a microcomputer to schedule students into a series of small group career exploration sessions. Current and potential uses of computer applications in other areas of student services are outlined by Reardon, Shahnasarian, Maddox and Sampson (in press).

Educational institutions are likely to continue leading other settings in computer assisted guidance development and utilization. The characteristics of cost effectiveness, operational appeal, elimination of routine counselor tasks, speed of operation, and reports of positive results make computer guidance systems popular among both students and counselors.

Private Business

Computerized technology designed to meet individual career development needs and facilitate the effective utilization of human resources has recently spilled over into organizational settings. The primary focus of computer based guidance applications in organizations is to assist employees with career development concerns, including career planning, adapting to career change, and identifying training and development needs. Computer systems for improving human resource management are also in operation.

Individual, social, and organizational costs accrued through ineffective job placement and career progression are often significant; computer applications minimize these costs by reconciling individual and organizational needs. Career planning systems that integrate the qualifications and career aspirations of the employee with the employment needs and career opportunities of the organization are likely to educe mutually rewarding outcomes with respect to job satisfaction and productivity (Clement, 1982).

Most organizations, particularly those in private business and industrial settings, have profit-making objectives. The need to quantify the effectiveness of career development interventions is often imperative in industrial settings (Papalia & Kaminski, 1981).

Ceriello (1980) suggested that automated human resource management systems have potential applications for several personnel administration functions, including compensation, manpower planning, career development, employee relations, and equal employment opportunity. The success of these systems is assumed to be integrally related to the preparation done before the systems are installed; management must be able to communicate its needs to computer technicians or acquire a packaged system that operates well when applied to specific groups or personnel units (Shahnasarian, 1983).

The perceived benefits of good human resource management and career development systems in organizations are well documented (Amico, 1981; Durell, 1982; Shahnasarian, 1983). Among the potential benefits most often cited are increasing employee morale and satisfaction through automated searches for promotable persons, maintaining accurate salary histories, providing steady growth and career development for employees, and reducing employee turnover by advising employees of opportunities for horizontal and vertical job mobility within an organization.

Domkowski (1984) and Morgan, Hall and Martier (1979) reviewed career development activities frequently conducted in organizations. Table 2, presented earlier, summarizes several activities which may be facilitated by computer assisted guidance systems and data based management systems.

New organizations can also customize computer assisted guidance applications to meet the career development needs of their special populations, including disabled individuals, dual-career couples, minorities, new members, outplaced individuals, and various other targeted groups (e.g., high potential members, midcareer members, technical groups). An accurate assessment of special population needs is essential in the process of developing a customized computer assisted guidance system. After needs have been defined, the company can design a computerized system which establishes goals, suggests strategies, and outlines goal-directed activities.

Several computerized human resource management software packages are currently available. The Human Resource Management System (HRMS) assists organizations in performing personnel administration tasks. The HRMS has been successfully implemented in several Atlantic City, New Jersey casinos ("Mini Has Hand," 1980). Uses of the system include payroll tracking, monitoring of hours spent by each employee on the casino floor, and storing information relating to each

individual's skills and job-related abilities. When a job opening occurs, managers can use a terminal to access a computer file which lists employees possessing the required skills for the openings. Information regarding each employee's training, education, and experience is maintained in a skills bank. The capacity of the HRMS to store extensive employee records makes the system especially valuable in organizations that have policies of trying to promote from within if possible.

The Corporate Occupational Information System (COIS) is a computer assisted career guidance system designed for use in business organizations. Amico (1981) described the system as a computerized information-retrieval program for accessing data on organizational occupations and projects. The system can also store information on a variety of occupational titles within an organization. While the HRMS was designed primarily for use by managers, COIS can be used by both managers and employees. An employee can specify desired career criteria such as educational requirements, geographic preferences, skills needed, and desired travel frequency to locate occupations within the organization which match the criteria entered into the system. Managers can use COIS similarly to identify possible candidates for job openings by matching job requirements and employee records.

The HRMS and COIS computerized systems integrate information regarding occupational characteristics entered by the user and search data bases to generate information which meets or exceeds the requirements specified. "DISCOVER for Organizations" is a microcomputer-based career development system that helps employees become aware of and improve their fit with the organization (American College Testing Program, 1983). In addition to the structured searches and information dissemination furnished by the HRMS and COIS, "DISCOVER for Organizations" offers users instruction in the career decision making process; assistance in identifying interests, skills and work-related values; information about the organization; assistance with goal setting and decision making; and assistance in developing future plans.

The DISCOVER system can also be customized to include information specific to an organization, such as company-specific position descriptions, career ladders, or organizational charts. The localized information must be periodically updated to keep the system current with the evolving organization.

The popularity of customized computer assisted guidance and human resource management systems in organizations will probably depend upon the balance between

costs and benefits accrued through the implementation of a tailored system. A positive relationship between investment in computer technology and the improvement of employee career development and achievement of the goals of an organization is likely to augment the development of new systems.

Potential applications of computer assisted guidance and human resource management systems in organizations vary. Issues related to return-on-investment are likely to influence the degree to which this type of computer technology is implemented. Due to the relatively recent introduction of computer assisted guidance and human resource management systems in organizations, comprehensive evaluations are not available.

Other Settings

Although most computer assisted guidance systems reside in educational organizations and private businesses, computerized applications are also in operation in several other locations. Among those settings are vocational rehabilitation centers, the armed services, and a preponderance of settings targeted for special populations.

Many of the computer systems used for rehabilitation purposes focus on the physical and functional characteristics associated with an occupation. Some systems also explore job modification in an interactive format. Kruger (1980) described the VOCOMP and ESI-Hester systems designed for rehabilitation clients. Private sector rehabilitation practitioners are beginning to use microcomputers in a variety of tasks, including word processing, data-base management, financial and program planning, and electronic communication (Crimando & Sawyer, 1983).

Sampson (1984) noted a tendency among developers of computer assisted career guidance systems to tailor the applications to meet individual needs within a specific organizational setting. The Officer Career Information and Planning System (OCIPS) is an example of such a specialized system. OCIPS is a computer assisted manpower management and career progression system designed for Army Officers (Philips et al., 1980).

Applications of computer assisted guidance have also been customized for a variety of special populations, including unemployed individuals (Pierce, 1972), deaf students (National Technical Institute for the Deaf, 1976), women returning to the workforce (Dickson, 1979), and individuals employed in the health professions

(Wright, 1978). The spread of automated guidance applications to other settings and use among special populations is likely to continue as computer technology becomes more sophisticated and a demand to meet special needs is expressed.

Chapter 3
THE DYNAMICS OF CHANGE

This chapter notes factors that program directors and counselors need to consider as they plan to implement a computer application. These factors are important because they allow the director or counselor to anticipate and mediate problems that may arise during both system planning and implementation. Additionally, this chapter previews the complexities of the planning/decision-making process, while suggesting Bonar's (1975) model for developing an educational career guidance program as a guideline for implementation planning. Finally, consideration is given to the change process itself and to strategies for coping with resistance to change. The main purpose of this chapter is to present general systemic issues and considerations that are relevant to the implementation process. Chapter 4 builds on this foundation and specifies a detailed model for implementing CACG systems and other computer applications.

The first section addresses a systems view of the department wherein internal and external factors must be assessed as the introduction and implementation of a system evolves. The second part of this chapter discusses the decision-making process, and the third addresses change processes related to implementation of a computer application.

A Systems Perspective of the Department

Every educational institution delivers a broad range of services to a client or target population. Through the acquisition and effective use of human, financial, and capital resources, institutional departments provide beneficial services to students, faculty, and community members. These services may include classes, symposiums, workshops or clinics that meet the identified needs of the client population. In order to provide truly useful services, program directors and counselors must remain aware of the important internal and external factors that encourage or impinge upon optimal effective service delivery.

Internal factors might include the type of authority exercised in the department, the delegation of responsibility, the staffing and expertise of department

members, and the prevailing hours of service provision. External factors could include technological support services for a CACG system, funding for operation of the department, changes in client preferences, or governmental regulations governing provision of services to the handicapped. Both sets of factors impact on the smooth operation of the department. Careful attention to and consideration of both arenas contribute to effective implementation efforts by reducing uncertainty and guesswork in the implementation process. This increases the department's ability to cope with changes that do arise, either internally or externally (Miles, Snow, & Pfeffer, 1974).

Since the implementation process requires coordination and anticipatory planning by program directors and staff, it is important that all departmental members understand the linkages between and interaction with the department's own efforts to implement a CACG system and the impact of this process within the wider institutional setting. Promoting a broad perspective on the implementation process allows all staff members to contribute their views and expertise to the planning and development of the program.

Student services program directors and counselors need to keep the following considerations in mind as they work toward CACG implementation:

1. The internal state of the department and its various staffing and service delivery functions.

2. The existence of important institutional or external factors that can either facilitate or inhibit the CACG implementation program.

3. The relevancy of the CACG system to department goals and direct needs.

If the program director and staff remain open to analysis of these basic factors, the likelihood of successful implementation is increased, while the existence of conflict and resistance is reduced.

Finally, in taking a systems perspective, the program director and staff should be aware that departmental power issues (Pfeffer & Moore, 1980), intergroup conflict (Evan, 1965), and technostress (Brod, 1982) can all make the implementation process more complicated and time-consuming if not handled in a systematic way.

Planning and Decision-Making

Any change in a department's delivery of services causes a period of reorientation for staff. During the implementation process, program directors and staff should openly consider the impact of the change endeavor on the pattern of relationships, both professional and personal, within the department. In this way, the implementation process can be designed to minimize both stress and resistance that may damage staff effectiveness in delivery of services (Beyer, 1981).

In this context, the program director and his or her staff should realize that within their department there is a "culture" or interactive pattern of norms, values, and behavioral expectancies (Pettigrew, 1979) that influences both formal and informal relations within the department. An effective implementation effort addresses this context and provides staff with the opportunity to discuss both their positive and negative feelings regarding not only the introduction of a CACG system, but also the overall impact of the system on how they, as staff, continue to deliver services and coordinate efforts.

Baker (1981) noted that informal groups within a department can have great power to resist the introduction of change. To best facilitate the implementation process and the change outcomes, the formal and informal resources of all staff should be used by the program director in the planning and implementation process from a collaborative perspective. Such an approach allows for synergistic use of the department's many resources in an open, interactive manner.

Successful planning and decision-making is predicated on an a priori analysis and anticipation of the various types of problems and influences that internally and externally impact on the implementation of the CACG system. In this sense, the anticipatory planning process includes both a long-term view related to the eventual role of the CACG system in the department's overall functioning and short-term planning that focuses on the day-to-day operation of the CACG system within the current departmental delivery scheme (Walker, 1980).

Proactive planning and decision-making should begin well in advance of the actual implementation process. The broader, more pervasive, and collaborative the planning and decision-making process, the more likely that the transition to CACG system use will be positive (Blake & Mouton, 1970).

Bonar (1975) suggested a model for program development activities and implementation endeavors within educational and counseling settings. A brief overview of the model provides a good set of checkpoints appropriate for use during CACG system implementation programs.

A. **Clarifying the problems.** Herein, the program director and staff consider all of the problems that the given program addresses within the institution. In the case of a CACG system, the focus of clarification might be on such things as identification of service delivery gaps, extent of services provided, establishment of a monitoring system for the program, or selection of the types of systems that best fit the desired outcomes of the program.

While these problem areas are broad, they represent goal categories that provide direction for the implementation process and a structure for considering the various purposes and roles of the system within the total context of departmental services.

B. **Identification of program constituents, their needs and entry characteristics.** The director and staff need to decide upon the appropriate client or target audiences and determine exactly what needs the system will meet via the delivery of specific information or guidance and support. Further, staff members evaluate their current level of expertise and determine the extent and nature of additional training they need to work successfully with the delineated client groups and with the technological characteristics of the system. Bonar also suggests that program planners gather extensive reliable data about the target groups and their needs and begin this process simultaneously with the first step in the planning process.

C. **Formulating specific goals and objectives.** After careful analysis and discussion during the first two steps of the process, the director and staff establish the broad goals and specific objectives for the CACG implementation program. It is crucial that these goal statements represent a pervasive coverage of the desired outcomes expected from the CACG system after it is operational.

In this phase, the program director and staff clearly outline those things that they can reasonably expect the new CACG program to deliver after staff have been trained in its application. Delineation of these goals also serves as a baseline for evaluating the CACG system.

D. **Ascertaining evaluative techniques.** It is important to structure an evaluative format for the CACG system from both a product and process perspec-

tive. The product evaluation will indicate if the system delivers intended outcomes to the appropriate client groups, while the process evaluation assesses the efficacy of operational activities involved in delivering the desired services.

E & F. **Organizing program elements and sequences into appropriate relational contexts and determining the role of media and technology.** Within these concurrent phases, Bonar suggests that a comprehensive effort be initiated to plan both the informational and instructional processes that will lead to achieving program goals. Such things as the use of other media resources, the nature of the counselor intervention, and the provision of additional client services must be considered. These phases represent the efforts of the department to organize the administrative aspects of service provision, the curricular aspects of informational provision, and the support aspects of counselor involvement in the overall intervention.

This is a rather complicated task, and Bonar delineates a number of specific considerations, including location of the program, funding contingencies, instructional/guidance formating, outreach and referral linkages, provision of services to special populations, the competency base of the program, and the mix between informational and instructional resources.

G & H. **Constructing program elements and sequences, and conducting formative and summative evaluations.** After deciding on the place of the CACG system within the broad delivery structure of the department, actual implementation begins, with a keen awareness that the program can be managed most successfully when there is ongoing evaluation and re-evaluation of both the program objectives and the ways in which services are provided. Herein, staff training continues as the initial system formating is fine-tuned to work more effectively. Refinement of processes and use of exploratory, new delivery models allows for flexible adaptation of the entire CACG system to make a better fit between client needs and available services. Continual process evaluation (formative) and evaluation of the outcomes for users (summative) allow for corrective feedback so that the delivery of services can be redesigned or adapted to coincide with the changes internal to the department or external in the client groups or in the mission of the institution.

As has been noted, a collaborative approach to the process is most likely to facilitate smooth implementation and operation of the CACG system. Program directors can enhance the nature of this collaborative effort by promoting creative inputs from the staff through the following steps (Steiner, 1965): (1) allow staff to

exercise self-control and self-determinism; (2) encourage open communications within the planning process; (3) encourage and support research and evaluation activities relevant to the implementation program; (4) use creativity enhancing activities, e.g., brainstorming, nominal group processes, visualization; (5) promote divergent thinking and risk-taking in the planning process; (6) encourage diversity of debate about the program; and (7) evaluate ideas and suggestions on their relevancy and merit rather than on the status of the contributors.

In summary, planning and decision-making prior to the change endeavor can enhance subsequent success with the CACG system, especially when anticipatory, collaborative, and creative planning is matched with a well-defined implementation format such as Bonar provides. Attention will now focus on the process of change and on ways to handle possible staff reluctance and resistance to change.

The Change Process

While planning and implementation of a CACG system are complicated, there are facilitative ways to go about managing the change process. Some of these strategies have been suggested previously. This section provides more detail on ways to smooth the introduction of computer assisted technology into a student services program.

Lewin (1958) suggested that change involves three factors: (1) unfreezing of present behaviors and attitudes in a system; (2) movement toward acquisition of new behaviors and attitudes that change the status of the system; and (3) refreezing of behaviors and attitudes so that new learnings evolve in the system.

Within the context of CACG implementation, the primary goal of the student services department is introduction and effective use of a CACG system. Step I involves helping staff members become aware of and less resistant to the concept and applications of computer assisted career guidance, while allaying their fears that they will be unable to learn the system or will be replaced by the computer. This first step can also help staff members resolve unrealistically positive perceptions of the results of change. Perceiving computer applications to be a panacea for both counselors and clients can be as limiting as staff reluctance to use this technology. In this process the director and staff share information, discuss reluctances and

resistances, and clarify the goals and objectives of the implementation endeavor. The unfreezing process helps staff feel more comfortable with the changes and delivery system adjustment related to implementation of the CACG system.

Step 2 focuses specifically on the education, orientation, and training of staff members in system operation, while giving them some ownership in the decision-making process related to implementation and utilization of the CACG system.

During Step 3, and simultaneous to the introduction of the CACG system in the student services department, planning and development of the implementation program continues so that the CACG system becomes a fixed component of normal departmental functioning and so that staff concerns and ideas are addressed on a timely basis.

A second generic model for change has been proposed by Burke (1982) that supplements Lewin's perspective quite well. First, the program director should identify a primary change agent or agency. This position may be given to a staff member, a staff committee, or to an outside consultant who is responsible for directing the implementation process through to finalization and initial evaluation. Often several types of change agents can be used to ensure objectivity, technological support, and collaborative efforts that optimize the process (Robbins, 1978).

In Burke's view, data acquisition and utilization is the second phase in the change process. Herein, information is gathered about the state of the department, the state of the institution, and factors that will influence the implementation and maintenance of the CACG system. This information is then used to clarify the planning path.

Collaborative and participative planning is the third phase in the change effort in which program staff evaluate the overall planning and implementation format and trouble-shoot potential roadblocks. This process offers a "dry run" opportunity for the actual process of implementation and promotes cost effectiveness in that mistakes are made on paper and not in the delivery of services.

The fourth phase, implementing under supervision, occurs as the actual CACG program elements and sequences are integrated into the overall functioning of the department. Trial runs and experimentation allow the change agent(s) to clarify or change goals and objectives if they prove to be deleterious to effective implementation and service delivery.

The fifth phase involves institutionalization of the CACG system in the service repertoire of the department. This is a continuing activity which provides new information to staff, while allowing for the monitoring of service delivery to ensure that the CACG system is operating in an optimal framework and in conjunction with other departmental services.

During all phases of the process, the program director and the change agent, individual or group, should promote what Argyris and Schon (1978) defined as double-loop learning rather than single-loop learning. With single-loop learning, the staff learn within the existing norms of the department, but are not really asked to change their skills, behaviors, or attitudes to meet the demands of the implementation of the CACG system. With double-loop learning, staff reframe their skills, behaviors, and attitudes according to the new set of standards brought about by the proactive introduction of the CACG system. Double-loop learning is a time-consuming process, but one which allows for the necessary movement from present to future states of service delivery with the integration of the CACG system.

Ackerman (1982) noted that positive outcomes occur most often when the following conditions prevail during the change endeavor: support and commitment of top administrators to the purposes and goals of the change process; availability and use of general and specific expertise to coordinate the process; availability of resources, including finances, to fuel change; and an overall willingness within the department and within the wider administrative unit to risk the consequences of change and implementation.

Other considerations that enhance the process of change include: (1) relative flexibility in the operating structure of the department (Brutenhuis, 1979); (2) realization of and support for the idea that change and innovation are good for the department and for the provision of its services (Mangham, 1979); (3) a willingness to take risks and cope with uncertainty during the change process (Mintzberg, 1979); and (4) provision of opportunities for the department to look at the way the change will impact on current departmental thinking related to service provision (Dunbar & Dutton, 1982). Proper planning and implementation analysis can obviate some of the natural resistance and possible conflict which occur when staff members face the introduction of a new and somewhat revolutionary computer system.

Chung and Megginson (1981) suggested that resistance to change occurs for five primary reasons: (1) lack of necessary resources to manage the change endeavor; (2)

allegiance to historical or traditional ways of doing things at the expense of innovation and improvement; (3) anxiety related to the consequences of and stress involved with change and adaptation; (4) fears of economic or job displacement; and (5) concerns about disruption in the normal social interactions within the given system. Marris (1975) noted that individuals or groups frequently don't resist change itself; rather, they fear the possibility of loss and destabilization of customary expectations that may come about during the change effort.

An especially relevant source of resistance is technostress (Brod, 1982), which occurs when individuals or groups are unable to adapt to the introduction and operation of new technology, especially computerized systems. Technostress can lead to deepened resistance within the implementation process, to an increase in errors and systems mismanagement, and to increased problems with service delivery. Providing staff with sound orientation and inservice training on the theories behind CACGs and on the variety of uses of a CACG system can mitigate this technostress factor.

Throughout this section, implicit suggestions for coping with resistance to change have been offered. Comprehensive, sequential planning, the use of a change model, and open communications are the crucial factors in managing resistance. Additionally, Chung and Megginson (1981) offer seven general coping strategies that afford program directors and change agents some degree of management control over the perpetuation of resistance when applied to CACG implementation.

1. Communicate the need for and the rationale behind the implementation process. Do not assume that the staff understands programmatic intentions or the purposes of a CACG system.

2. Communicate the potential benefits that may accrue with the introduction of the CACG system. The more specific the statements about these benefits, the better.

3. Be sensitive to and protective of the interests of staff members. This implies that the program director and the change agent(s) analyze the need for change in advance of initiating the change so that they can identify areas where potential conflicts of interest may arise.

4. Involve staff in all sectors in the planning and change process. Consider using an MBO or a quality circle approach to implementation.

5. Provide progress reports and updates to staff on a regularly planned basis and consider circulating a newsletter about the endeavor.

6. Identify and use change agent(s), whether internal or external, who have credibility and power to influence the movement and acceptance of the planned implementation strategy.

7. Reinforce earlier successes with subsequent successes which give positive continuity to the implementation endeavor. This reiterates the sequential nature of the implementation process and the need to build on and evaluate from the earliest phases of the selected implementation model.

In summation, the implementation of a CACG system within a student services department is a complex but positively manageable process involving consideration of the internal activities and purposes of the department, the impact of wider institutional factors on the implementation process, and selection of an approach to implementation that accentuates the proactive use of human and financial resources to ensure that the system functions to its full potential. Prior planning and issue identification can help to reduce transitional stress and resistance to change which may occur during the actual implementation sequence. Overall, the responsibility for the success of the project rests with the entire staff of the given department and in this sense, all members should be involved, coherently and thoroughly, in all phases of the implementation process.

Chapter 4
THE IMPLEMENTATION PROCESS

This chapter presents specific suggestions for implementing computer assisted career guidance and other computer applications for the adult learner. The first section explores a variety of general considerations that are related to enhancing the implementation process. The second section categorizes existing implementation models. The third section includes a detailed description of a specific implementation model.

Enhancing Implementation Efforts

Several factors that have deleterious effects on implementation efforts were discussed in Chapter 1. Often, problems resulting from inadequate staff input in the implementation process contribute more to implementation difficulties than problems resulting from technological malfunction. The introduction of a computer application is likely to create a disturbance in a group's interpersonal dynamics. A proactive implementation strategy that is systematic and comprehensive in scope is crucial for superior system operation.

The successful implementation of a computer application involves prudent deliberation of a range of interrelated interpersonal and logistical considerations. Suggestions for enhancing implementation efforts are frequently documented in literature pertaining to the implementation process. Attention to a variety of details prior to the actual physical introduction of a computer application is assumed to enhance the subsequent implementation process. Among the preliminary considerations in the implementation process which merit attention are managerial and staff support, degree of staff involvement in the computer application planning process, delineation of roles and responsibilities, creation of an implementation strategy, and provisions for the monitoring of implementation progress.

In many cases, the success of an implementation effort is predicated on the carefully considered support provided by senior level administrators (Christensen, 1980; Walz & Benjamin, 1977). An administrative commitment to implement a

computer application often encourages staff members to invest personally in the change process. Staff members are likely to be more supportive if change efforts are endorsed by administrators.

Involving staff members in the planning for computer applications is absolutely essential in the implementation process (Clabaugh, 1983; Knechtel & Purdy, 1983; Lawton & Gerschner, 1982; Maze & Cummings, 1982; Schoech, 1982; Walz & Benjamin, 1977). However, resistance to change may occur even when staff members are involved in the planning process. A proactive strategy for overcoming staff resistance often associated with implementation efforts is advocated by Byrnes and Johnson (1981). Reducing role ambiguity through clearly delineated descriptions of both individual and group roles and responsibilities in the implementation process is also important.

The selection of a comprehensive implementation model capable of meeting the implementation needs specific to a predetermined setting should also occur prior to the physical introduction of a computer application. An appropriate model provides a guide to the interpersonal, procedural, and managerial details requiring attention in the implementation process. The importance of preselecting and adhering to an appropriate implementation model cannot be over-emphasized.

Communicating the progress of implementation efforts is also essential (Schoech, 1982). The establishment of a communication network can help reduce staff resistance while also increasing staff knowledge about the computer application. Establishing realistic time frames for the implementation process (Christensen, 1980) and pursuing gradual rather than rapid changes (Schoech, 1982) can also be facilitative.

Existing Implementation Models

Sampson (in press) identifies two categories of implementation models: design type models, and selection type models. This classification scheme is based upon the manner in which computer software is obtained. According to Sampson:

> The design type of model is used when available software does not meet client and organizational needs, and original software is developed as part of the implementation process. (p. 9)

The reader is referred to J. H. Johnson (1980), Newkham and Bawcom (1981), Sampson (1982b), Schoech, Schkade and Mayers (1981), and Taylor (1981) for more detailed descriptions of the design type model. Sampson (in press) further specifies that:

> The selection type of model is used when available software does meet client and organizational needs, and this software is selected as part of the implementation process. (p. 9)

Selection type models are described by C. S. Johnson (1980), Maze and Cummings (1982), and Maze and Perlmutter (1983). A general model of the change process that is appropriate for both design and selection approaches is proposed by Walz and Benjamin (1977).

Implementation Model

Sampson (in press) presents a selection type implementation model for computer applications in counseling and human development services. Table 4-1 provides an overview of this model.

The four sequential phases involved in the implementation process include: (1) planning; (2) staff training; (3) trial; and (4) operation, evaluation, and refinement. The physical size of each symbol in Table 4-1 corresponds to the relative amount of time devoted to each phase in the implementation process, and provides a graphic illustration of the importance of planning in the successful implementation of computer applications. Additional planning activities can be initiated as needed after the completion of each phase.

Table 4-2 provides a more detailed description of the steps associated with each phase of this model. The planning phase begins with the selection of a computer application.

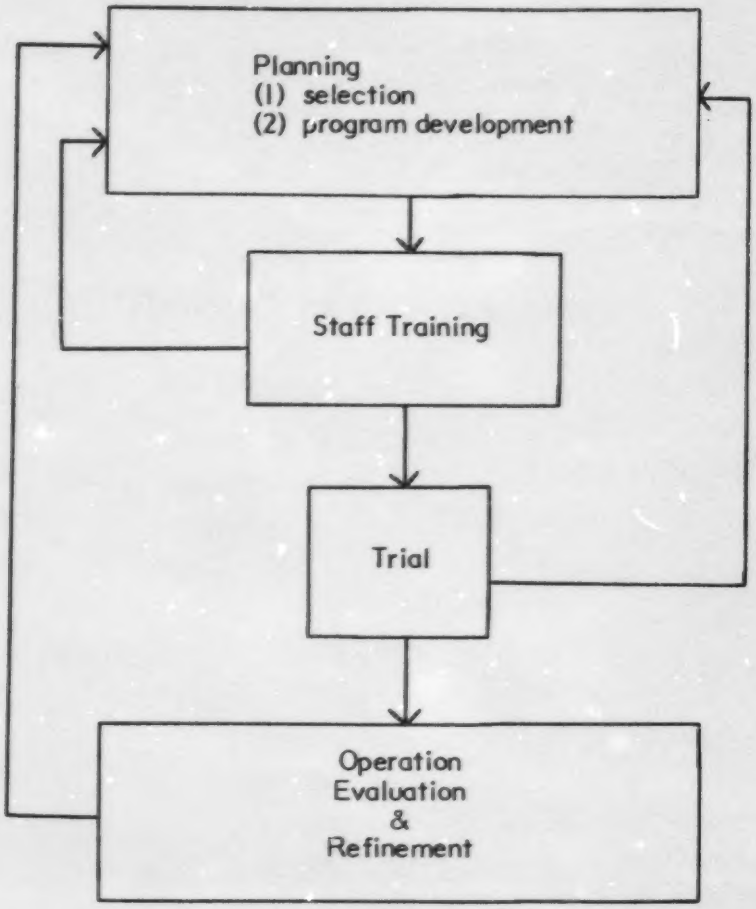
Planning Phase

Evaluation of existing client needs. The first step in selecting computer applications involves obtaining baseline data on the needs of various client groups. Such data would include general needs of all clients for information, alternative

generation, and instruction on decision-making, as well as the special needs of high school and college students, disabled persons, women returning to the work force, and persons interested in mid-career change.

Table 4-1

Overview of the Implementation Process



Note: From "Maximizing the Effectiveness of Computer Applications in Counseling and Human Development: The Role of Research and Implementation Strategies" by J. P. Sampson, Jr., in press, Counseling and Development Journal.

Table 4-2

Implementation Model

PLANNING PHASE

Selection of Computer Applications

1. Evaluation of existing client needs
2. Evaluation of the effectiveness of present services in meeting client needs
3. Identification of unmet needs
4. Identification of computer software that may assist in meeting client needs
5. Evaluation of computer software in terms of:
   a. potential to assist in meeting client needs
   b. congruence with existing program goals
6. Selection of computer software
7. Selection of computer hardware
8. Assessment of potential need for external consultants

Program Development in Counseling and Human Development

9. Integration of computer applications with existing services (including individual, group, and curricular approaches)
10. Delineation of staff roles in terms of
    a. counselor intervention strategies
    b. management of computer application
    c. clerical support
11. Development of an evaluation strategy
12. Identification of data needed for a program evaluation
13. Delineation of operating procedures
    a. scheduling counselor and computer appointments
    b. maintaining confidentiality of all client data
    c. collecting data related to program evaluation
    d. maintaining computer hardware
14. Selecting a location for the computer hardware that
    a. maximizes security
    b. minimizes environmental problems related to dust, temperature, humidity, and visual and auditory distractions
15. Development of a strategy for institutional and public relations

STAFF TRAINING PHASE

Development of a strategy for staff training that includes

1. Review of program and computer application needs
2. Presentation of an overview of the application
3. Orientation to computer hardware and software
4. Completion of the application by each staff member
5. Review of all staff roles
6. Review of operational procedures
7. Review of case studies for purpose of integration

Completion of initial staff training
Identification of topics for additional training efforts
Continuation of training as needed
Initiating institutional and public relations efforts

TRIAL PHASE

Identification of trial users
Completion of the computer application by trial users
Analysis of observational and interview data from trial users
Revision of staff roles and operational procedures as appropriate
Continuation of institutional and public relations efforts

OPERATION, EVALUATION, AND REFINEMENT PHASE

Full scale operation of the computer application
Collection and analysis of evaluation data
Refinement in staff roles and operational procedures as appropriate
Continuation of institutional and public relations efforts

Note: From "Maximizing the Effectiveness of Computer Applications in Counseling and Human Development: The Role of Research and Implementation Strategies" by J. P. Sampson, Jr., in press, Counseling and Development Journal.

Evaluation of the effectiveness of present services in meeting client needs. The next step involves determining the extent to which current needs are being met with existing services. Staff perceptions as well as surveys, client interviews, assessment instruments, and literature reviews can be used to gather appropriate data to determine gaps in service delivery.

Identification of unmet needs. An analysis of evaluation data may reveal specific needs that are not currently being met by existing services. For example, present services may not provide for structured searches of educational institutions by academic majors offered, size, or geographic location. Analysis of evaluation data may also reveal that the efficiency of present services is limited. For example, considerable staff time may be currently expended on maintaining accurate salary data on occupations.

Identification of computer software that may assist in meeting client needs. Before it is possible to identify potentially appropriate software, it is necessary to

have a general understanding of the capacities of CACG systems. Chapter 2 of this monograph is a potential source for this type of information. Identification of potentially appropriate systems is facilitated by reviewing various comparisons of CACG software. File (1983), Maze and Cummings (1982), and Shatkin (1980, 1983b) provide comparative CACG system descriptions.

Evaluation of computer software. This process begins with an analysis of the potential of each CACG system under consideration for meeting defined client needs. For example, if a significant portion of the clients being served has poor decision-making skills, then it would be important to select a system that emphasizes this function. No CACG system exists that is capable of meeting the career development needs of all potential clients. Each system has advantages and disadvantages for specific client groups. A CACG system is also only one of many components in a larger career guidance program. Harris-Bowlsbey (1983) and Maze and Perlmutter (1983) stress the importance of selecting a CACG system that is congruent with the existing guidance program. For example, if clarification of work values is an important aspect of the existing guidance program, then the CACG system selected should include an assessment of work values.

To assist in the evaluation process several authors describe various factors for discriminating among CACG systems. Harris-Bowlsbey (1983) identifies content, hardware, access strategies, data files, and user cordiality as important factors to consider in evaluating software. Katz and Shatkin (1980) describe eight dimensions for comparing CACG systems that include scope, content, structure, style, procedures, costs, effects, and rationale for guidance and model of career decision making. Maze and Cummings (1982) include system goals; didactic, assessment, and information components; internal structure; system management; and system requirements in their checklist for system evaluation. Riesenberg (1983) details a software selection process that includes the following variables: scope, content, method of use, hardware requirements, target user population, and cost of operation. Factors such as existing research and evaluation data and the quality of available training materials are also important. Additional evaluative criteria for software selection are provided by Sampson (1984).

After determining a common set of comparison factors, it is necessary to collect data on specific systems. Riesenberg (1983) makes these suggestions:

> Collect and read the written materials published by system representatives ... Ask publisher for list of users and consult with other users of those systems under serious consideration ... Get hands-on demonstrations of those systems under serious consideration. (pp. 25-26)

A final factor in the software evaluation process involves environmental considerations. Each system under consideration needs to be evaluated in terms of the potential need for additional physical space for the location of computer hardware, the potential need for additional staff, existing computer hardware available in the organization, and existing budgetary resources.

Selection of computer software. In view of the benefits of staff participation in the implementation process, the actual decision-making regarding CACG system selection should involve staff input. One method of achieving this is to create a committee to review available software and make specific recommendations.

Selection of computer hardware. Clabaugh (1983) identified the following factors in the process of hardware selection: brand of computer, memory, external storage, video display, expansion capability, printers, alpha numeric capability, graphics and sound, modems, documentation, durability, security, dealer, support groups, price, warranties and service contracts, ease of use, and extras and special features. In some cases the options for selecting hardware are restricted to a small number of computers that are compatible with the CACG software. Even when choices are limited, however, the awareness of the hardware selection factors identified above is helpful when considering the appropriateness of a given computer for applications in addition to a CACG system—e.g., also using a microcomputer for maintaining an index of career materials.

Assessment of potential need for external consultants. Successful implementation of computer applications requires a variety of staff skills and specialized expertise. It is quite possible that existing staff members are well prepared for this task. In some settings, however, they may not presently have all the necessary competencies for implementation efforts. When faced with this dilemma, some administrators have decided that staff members can gain additional competencies as the implementation process progresses. The wisdom of such a decision is often questionable. The additional funds expended due to errors in implementation can easily exceed the funds saved by not hiring an external consultant. When all parties clearly understand the role of the consultant and when the skills of the consultant

match the needs of the organization, then the use of this resource can be very cost-effective.

The role of the consultant is to help staff members gain the competencies necessary to complete the implementation process. The consultant can provide specialized information and facilitate the process of making implementation-related decisions. In some cases the consultant may be involved at a very early stage by providing assistance with software and hardware selection. External consultants can also be helpful in the staff training phase. It is not an appropriate role for the external consultant to make decisions. As stated previously, inadequate staff participation in decision-making is a major factor in the development of staff resistance to change. It is important for administrators and staff members to maintain control of the overall implementation process.

The following factors are relevant to the selection of an external consultant: prior experience in the implementation process, prior experience in the development or management of computer applications, prior experience with organizations and client populations which match the specific client's situation, and prior consulting experience (including references). It is essential that any consultant be knowledgeable of the counseling and program development process. Schoech (1982) and Taylor (1981) provide additional guidelines for the utilization of external consultants.

Integration of computer applications with existing services. Plans need to be formulated for integrating the computer application with existing services, which may include individual and group counseling, curricular approaches, and other computer-based systems. For example, the assessment component of a CACG system may replace the use of some traditional paper and pencil instruments. Ongoing acquisition of audiovisual career information may continue because these materials extend and supplement the data available from the CACG system. Some services may be modified or even replaced in situations where the computer assisted resource provides more effective service delivery while other program elements may remain unchanged. It is also important to determine the potential use of computer applications in individual and group interventions. Harris-Bowlsbey (1983) recommended that:

> the computer system should be utilized as a part of one-to-one career counseling, group career guidance, and career education/guidance curriculum so that there is a systematic flow of career guidance treatment regardless of one mode or combinations of modes of delivery. (p. 15)

Delineation of staff roles. One of the most critical factors in reducing staff resistance to the change process involves clearly defining staff roles. Considerable anxiety can be generated when staff members are uncertain as to how a computer application will affect their work activities. It is important to encourage staff input into the process of delineating roles for counselors, managers, and clerical support personnel.

A review of the literature reveals substantial support for including counselor intervention as part of a client's use of a computer application (Harris-Bowlsbey, 1983; Johnson, 1983; Maze & Cummings, 1982; Maze & Perlmutter, 1983; Sampson & Stripling, 1979; Shatkin, 1983b). The lack of adequate counselor intervention raises a variety of ethical questions (Sampson & Pyle, 1983). Sampson (1983) stated:

> Clients who are experiencing substantial emotional problems may be functionally incapable of appropriately interacting with a computer. Clients with excessive computer anxiety, or clients who have misconceptions about the process or outcome of using a computer application, may also use a system inappropriately. The need for a counselor to introduce and follow up a client's use of a computer application seems clearly indicated. (p. 71)

The following is a generalized counselor intervention model:

1. Determine if the needs of the client are congruent with the purpose of the computer application.

2. Determine if the client is emotionally, physically, and intellectually capable of interacting successfully with a particular computer application.

3. Introduce the general purpose and operation of the computer application to the client to ensure that the client's expectations are congruent with the intended outcome of using the system.

4. In situations where a client and counselor interact several times during the use of a computer application, introduce the initial component of the system. The counselor would then follow up the client's use of that component, monitoring his or her progress to identify and correct misconceptions and inappropriate use. Further

introductory and follow up interventions would be conducted until the system was completed.

5. Introduce the computer application and do a one-time follow-up in situations where a client completes the entire computer application before interacting again with the counselor.

6. Determine if the intended goals for a client's use of a computer application have been met. If the goals have not been met, then additional use of the initial computer application may be necessary. Or it may be appropriate to use a different computer system or some other traditional intervention (Sampson, 1983, p. 68).

The manager's role in the computer application is also important. Computer applications seem to operate most effectively when one individual has the responsibility for monitoring the system. This individual serves as a liaison between the staff and the system developer and provides leadership regarding the planning, operation and evaluation of the system. Maze and Cummings (1982) and Sampson (1982b) provide specific descriptions of the role of the project manager in implementing computer applications.

Clerical support staff also have an important role in the delivery of computer assisted counseling and student development services. Clerical support staff can be involved in scheduling appointments, initiating procedures for starting and stopping the computer system, orienting students to the computer hardware, monitoring student progress at the computer, troubleshooting software and hardware problems, and collecting evaluation data. The specific responsibilities of clerical support persons will vary among institutions depending on the number of staff available and the diversity of other tasks performed by these individuals.

The existence of a computer assisted career guidance system may create the need for additional staff. Some institutions have found that the use of existing career counseling and guidance services increased substantially due to positive student reaction and the high visibility of CACG systems.

Development of an evaluation strategy. Knechtel and Purdy (1983) stated that evaluation efforts contribute to the effectiveness of computer applications by providing feedback on system performance, publicizing, identifying areas for future expansion, and stimulating the interest of staff members in future innovations. Evaluation efforts also contribute to establishing accountability for the funds provided to operate a computer application. The quality of evaluation efforts is

improved when planning is completed during the program development phase. The evaluation strategy should include the goals and objectives for the evaluation, identification of the consumers of evaluation data and reports, and procedures for analyzing the data and reporting the results. Peterson and Burck (1982) present a general model that can provide the basic structure for evaluating computer applications.

Identification of data needed for program evaluation. A critical step in developing an evaluation strategy involves identifying data that can be used to show the impact of the CACG system on clients. Statements by developers regarding system goals, as well as results obtained from previous evaluation studies, can be used to identify potentially relevant data. For example, if a particular CACG system is designed to assist clients in developing career decision-making skills, then data are needed concerning the clients' proficiency in making career decisions after they have completed the system. Table 4-3 provides a description of potential variables that can be examined in the evaluation process.

The following methods are useful in obtaining evaluation data: questionnaires designed for a specific institution; standard instruments, e.g., measures of career decision-making skills; goal attainment scaling; structured client interviews; and observations of client behavior at the computer terminal. Katz (1980) and Katz and Shatkin (1980) stated that it is possible to program the computer to collect data on the specifics of individual or group use of a computer application. It is essential, however, that program managers obtain research participation release forms from any client who furnishes individually identifiable data as part of his/her use of a computer system (Sampson & Pyle, 1983). Early identification of necessary evaluation information allows adequate time for the development of data collection methods.

Delineation of operating procedures. Staff members can become extremely anxious if they lack understanding of how the computer application will function on a daily basis. This anxiety can be considerably reduced by clearly and comprehensively delineating operating procedures as part of the planning phase of implementation. Four aspects of this process are particularly important. First, a system for scheduling counselor and computer appointments is necessary. A scheduling system provides an organized method whereby clients gain access to the computer, limits

Table 4-3

Evaluation Variables for Computer Applications

Demographic data on clients who use the system
Expressed client goals for system use
Client characteristics that relate to system functioning
Example: measurement of potential change in career decision making ability after client use of a computer assisted guidance system.
Client behavior
Example: measurement of potential change in information seeking behavior after client use of a computer assisted career guidance system.
Client satisfaction with the system
Amount of client use of the system
Impact of intervention strategies by counselors and clerical support staff
Staff perceptions of the impact of the system on clients, staff members and the institution at large
Clarity and effectiveness of operating procedures
Quality of materials that are designed to support client use of a system
Example: localized career information that is reviewed in conjunction with client use of a computer assisted career guidance system.
Performance of computer software and hardware
Human factors
Example: determination of the user friendliness of computer software and hardware.
Cost effectiveness

computer access to appropriate individuals, and provides a rough indicator of client use of a computer application. Experience with scheduling systems indicates that using reminder cards for computer appointments tends to reduce the client "no show" rate. Other issues for decision-making include determining how far in advance to schedule appointments and procedures for blocking time for specific groups, e.g., career planning classes.

Second, it is critical to maintain the confidentiality of client data that are stored in the computer. Specific methods for ensuring such confidentiality are described by Greist and Klein (1981), Schoech (1982), Velasquez and Lynch (1981), and Vondracek, Urban, and Parsonage (1974). One advantage of microcomputer hardware is that one can turn on the system and remove the floppy diskettes, thus tending to restrict unauthorized access. Computer hardware with fixed disc drives and telecommunications links with other computers present more difficult security problems.

Maintaining confidentiality on large timesharing multiple terminal access systems is possible with careful and consistent use of passwords and file management techniques. Sampson and Pyle (1983) discussed ethical issues related to the use of computer assisted counseling, testing, and guidance systems. The Appendix includes a statement of ethical principles related to the use of computer applications.

Third, data collection is an essential aspect of the evaluation process. It is important to integrate data collection procedures with the general operational procedures of a computer application. For example, if evaluation data are to be collected before and after a client's use of a CACG system, then this process needs to be coordinated with other data collection efforts and the appointment scheduling process.

Fourth, program managers should develop computer maintenance procedures. While microcomputers have far fewer maintenance requirements than large mainframe computers, it would be erroneous to assume that this factor can safely be omitted from the planning process. A variety of maintenance options is available including individual and group preventative maintenance, on-site maintenance on demand, and off-site maintenance (where the owner has the responsibility for transporting the hardware to a repair fucility). Maze and Cummings (1982) suggested that the operating budget for a CACG system should include one service call per terminal (computer) per year. Procedures for troubleshooting hardware problems and rescheduling client appointments due to equipment failure are also important. The hardware vendor and other hardware owners can provide information that will assist in the maintenance decision-making process.

Selecting a location for the computer hardware. The location of computer hardware is influenced by access, security and environmental factors. It is important that both clients and staff members have easy access to the computer. CACG systems are typically available at career planning, counseling or guidance centers. The specific location of computer hardware within these centers is either in large open areas that also contain collections of career materials, or in adjacent rooms that are limited to computer use. These locations have the potential advantages of allowing clients easy access to the computer, facilitating staff monitoring of student access to the use of the computer, and providing clients access to other supporting resources, such as career information. It is important to avoid situations where other individuals can easily observe a client's use of a CACG system. A lack of

privacy can cause clients to question the degree of confidentiality involved in receiving services.

It is also important to place computer hardware in a location that provides maximum security. Adequate physical security lessens the likelihood that someone will gain unauthorized access to confidential data, use the computer inappropriately (e.g., game playing), or steal the equipment. All of these actions have an obvious negative impact on the ability of an institution to provide effective services. Locating computer hardware in rooms that can be locked is one way of dealing with this potential problem.

A final consideration in the location of computer hardware involves environmental constraints. While it is true that microcomputers are less sensitive to variance in environmental conditions than large mainframe computers, problems such as dust and high humidity and temperature can damage equipment and floppy diskettes. The environment can also negatively affect clients who use a computer application. An environment that is conducive to both human beings and machines enhances the operation of computer systems. Appropriate lighting, air conditioning, and privacy all contribute to effective computer applications.

Computer hardware for CACG and other counseling applications is frequently placed in college residence halls, student unions, libraries, and administrative offices. While these can be appropriate locations for this hardware, the lack of staff to answer client questions and monitor use of a computer system can reduce its effectiveness. The lack of other support materials in these settings, such as career information, and the greater security risk involved in placing hardware in high traffic locations, such as student unions and libraries, can further reduce system effectiveness. Computer applications other than CACG systems, especially those applications that require less staff monitoring, can be useful in residence halls, student unions, libraries, and administrative offices.

Development of a strategy for institutional and public relations. Lack of awareness on the part of prospective users and staff members/faculty of the existence of the service can limit the effectiveness of computer applications. It is important to publicize the computer assisted services to staff, faculty and administrators, who will be in positions to refer clients to this service and provide budgetary support for the continued operation of the system. It is also important to publicize available services to potential clients. Depending on the policy of the institution,

potential clients may be limited to currently enrolled students or may include members of the community as well.

Public relations efforts involve traditional print media (letters, flyers, posters and newspaper advertisements) and broadcast media (radio and television announcements). Some institutions have found that short videotaped programs in high student traffic areas are an effective public relations method. One of the potentially most effective publicity efforts involves personal contacts with faculty, administrators, and other staff members. Maze and Perlmutter (1983) suggest that these contacts can be made on an individual and a group basis, beginning with individuals who express interest in the application. While large group presentations about an application can be very productive, maximum exposure results from having faculty, staff and administrators actually use a particular system. Such an opportunity helps those individuals to understand the relevance of using a computer application to meet client needs, when the goals and actual operation of the system are clearly understood. Maze and Perlmutter (1983) describe a wide range of public relations strategies.

The manner in which a computer application is publicized can have a significant effect on potential client conceptions regarding the goals of the system. An incorrect but popular perception about traditional career counseling is that an interest inventory can provide the client with "the answer" that will solve his or her career decision-making problem. Unrealistic public perceptions concerning the inherent intelligence of computers and certain approaches to public relations facilitate this misperception. For example, print media that encourage clients to go to a specific computer application (e.g., CHOICES, CIS, COIN, CVIS, DISCOVER, ECES, GIS, or SIGI) for assistance with career decision making reinforce the belief that the computer application is the essential ingredient in the process. As discussed in Chapter 2, it is the client who is the most important factor in the decision-making process; the computer is only one of many tools to assist the client to reach his or her goals. A related problem occurs when faculty, staff and administrators refer clients to a computer system for assistance with decision making. A more appropriate alternative would be for all publicity efforts and personal contacts to refer clients to a total career counseling service that includes a variety of resources that are directed by counselors and student development staff members. In this way clients are less likely to depend on the computer application as a panacea for their

problems. This one action will not eliminate client misconceptions about what to expect from using a computer application, but at least the institution is not fostering inaccurate beliefs.

Staff Training Phase

Development of a strategy for staff training. The positive momentum gained from comprehensive implementation planning can be lost when inadequate effort is expended on staff training. Sampson (in press) states:

> While system developers have provided a variety of manuals and handbooks, few developers have taken a consistently active role in providing staff training (Clyde, 1979). It has been standard practice for some time to require users of prescribed psychological tests to demonstrate the completion of minimal training before obtaining the instruments. System developers have not, in general, required the completion of a staff training experience as part of the criteria necessary to obtain a computer application. Many institutional users of computer applications have not sought external assistance for staff development due to limited resources, lack of a perceived need, or both. When adequate staff training is not provided, at best it will take longer to make a computer application fully effective, at worst staff members will be incompetent or highly resistant and the system will not be effective in meeting the needs of the user. (p. 3-4)

The potential benefits of staff training include increased staff competence in facilitating the use of the computer application, improved staff cohesiveness as a result of shared experiences and group interaction, and reduced misconceptions concerning system operation. Effective training can be a major factor in reducing staff anxiety. Characteristics of successful training activities include adequate staff release time (Sheingold, Kane, Endreweit, & Billings, 1981) and adequate resources (Schoech, 1982). Herr and Scofield (1983) provided general guidelines for staff development efforts. As with other aspects of the implementation process, program managers can enhance the impact of staff training by planning the sequence of events prior to initiating the activity.

An important part of developing a strategy for staff training involves soliciting staff input regarding training needs. It is also important to determine whether or not to use an external consultant. In the training situation the consultant provides specialized information related to a specific computer application. Maze and Cummings (1982) described three alternatives for the selection of an external

consultant: a representative of the system developer, a counselor or trainer who is experienced with the operation of the computer application, and/or a "computer buff" who is willing to learn the system and in turn train the staff. The first two alternatives are generally preferable to the last option. The trainer should be fully knowledgeable concerning the operation of the computer application, the client population being trained, and the general nature of counseling and student development services.

A strategy for staff training includes several important elements. The process starts by having the project manager or external consultant review with the staff the general goals of the counseling and student development program and the specific goals of the computer application. This establishes a common frame of reference for the operation of the system. Then the manager or consultant presents an overview of the application to facilitate staff knowledge of system functioning. This is followed by an orientation to computer hardware and software. The hardware orientation includes an explanation of terminology, a description of component functioning, and a discussion of common misconceptions concerning computer operation. The software orientation includes a description of start-up and exit procedures, computer maintenance of client records if available, and access routes among modules/subsystems.

The staff training continues by having each staff member complete the computer application. Actual hands-on experience is essential in developing a complete understanding of both system operation and methods of facilitating client use of the resource. At this point it is appropriate to review the roles of staff members as previously designated in the planning phase, as well as operational procedures. This helps to ensure that staff members are fully aware of how the total counseling and student development program will function. It is quite possible that further exploration of these topics will prompt revision in staff roles or operational procedures. The staff can integrate the preceding training elements by reviewing representative case studies of typical clients using the computer application from initial contact to completion. This process helps them refine their skills and allows further evaluation of the relationships among individual service elements.

Completion of initial staff training. Sheingold et al. (1981) noted that when inadequate time was allocated to hands-on experience with the computer, staff members had difficulty in developing computer competencies. To obtain maximum

benefit from training efforts staff members must have time to complete all activities and integrate their experience with current approaches to providing services.

Identification of topics for additional training efforts. It is unrealistic to assume that any training program, no matter how sophisticated, can be successful without further training activities. The rapid rate of change in computer software and hardware emphasizes the need for continuing training efforts. At the completion of training, and at regular stages thereafter, the staff should assess their need for further training. For example, the counselor intervention strategies presented during training may not be appropriate for clients with physical disabilities. As a result this would become an important topic for future training. Written reactions by staff members of their own use of a CACG system, as well as clients' use of the system, facilitates planning of future training efforts.

Continuation of training as needed. One of the most obvious aspects of the application of computers to counseling and student development services is the rapid rate of change in technology. New software and hardware options are constantly available. Even if client populations and institutional services were static, which they are not, refinements in software and hardware would require additional training efforts. Several of the major CACG systems in use today have undergone a variety of changes in software and hardware. In view of this situation, there is a definite need to allocate funds for ongoing training efforts to ensure maximum benefit from the use of computer applications.

Initiating institutional and public relations efforts. During staff training it is appropriate to begin the institutional and public relations efforts described in the planning phase. Because it takes time to publicize the availability of a computer application to all the necessary groups and persons involved, it is not productive to wait until the system is fully operational before beginning this activity.

Trial Phase

Identification of trial users. The trial phase provides an opportunity for the staff to evaluate the effectiveness of a computer application and make necessary adjustments prior to full-scale operation of the system. They need to examine the performance of software and hardware as well as the effectiveness of intervention strategies and operating procedures. The first step in the trial phase involves

identification of trial users. Both experienced and non-experienced consumers of existing services should participate in the trial process. Involvement of experienced consumers allows useful feedback on comparisons between previous services and computer assisted services. Involvement of non-experienced consumers allows useful feedback on the impact of a computer application on clients who have not received prior services.

Completion of the computer application by trial users. The staff can obtain valuable evaluation data from trial users by observing their behavior at the computer terminal and by conducting structured interviews after the completion of the system. It is essential that trial users be fully aware that they are participating in a trial operation of a computer application. Trial users also need to provide prior approval for the collection of observational and interview data.

Analysis of observational and interview data from trial users. Conducting an extensive statistical analysis of data obtained within the trial phase is not generally necessary. Analysis of patterns within observational and interview data, along with staff perceptions, should reveal problems that need correction. For example, it may be noted that trial users experience difficulty in understanding written computer operating instructions provided at the terminal.

Revision of staff roles and operational procedures as appropriate. At this point final adjustments in staff roles and operating procedures occur. For example, at this point the confusing computer operating instructions mentioned above can be corrected. Reactions of staff members, including written comments, are especially useful in revising staff roles and operational procedures.

Continuation of institutional and public relations efforts. Institutional and public relations activities continue in this phase. As the trial phase ends, faculty, administrators and other staff members are informed of the date for beginning full operation of the system.

Operation, Evaluation, and Refinement Phase

Full-scale operation of the computer application. Full-scale operation begins when staff members are confident that the computer application and staff intervention strategies are functioning adequately.

Collection and analysis of the data. The collection and analysis of evaluation data follows the plan established during the planning phase. The evaluation process is seen as an ongoing aspect of providing services to clients.

Refinement of staff roles and operational procedures as appropriate. The provision of services is not a static process. The implementation model presented in Table 4-1 is dynamic in nature. Changes in client needs, staff skills and available technology are reflected in the evolution of staff roles and operational procedures for the computer application.

Continuation of institutional and public relations efforts. Institutional and public relations activities continue as needed. Future perspectives and concluding comments are presented in Chapter 5.

Chapter 5
FUTURE PERSPECTIVES

Our society in general, and our profession in particular, are experiencing a rapid rate of change. Much of this change is being brought about by the integration of computer technology into our daily lives. The computer is being used to complete an ever-expanding number of information processing tasks. Either directly or indirectly almost everyone interacts with computers and computer processed information. The question of "Should we use a computer?" is consistently changing to "How will we use the computer?"

The growing public and professional acceptance of computer technology is partially a function of the availability of this resource. The computer is becoming a familiar fixture in homes, schools, and small businesses. The availability of computer resources in libraries and community learning centers is steadily increasing. It is difficult to ignore this technology when it becomes an established part of the environment. Another factor that has contributed to the acceptance of the computer is its ease of operation. The extensive technical training needed in the past to operate a computer application successfully is generally no longer required. While it is true that some applications still call for advanced training and skill, most applications designed for the home, school, and business environment require minimal to moderate technical training. The computer has evolved from a specialized computational tool for the mathematician, scientist and engineer to a data processing tool for the general public.

Advances in the development of computer software and hardware will further enhance the integration of this technology into our society and our profession. Innovations such as automated software development, voice input and output, interactive videodisks, and holographic projections will make our present computers look as antique as biplanes appear in an age of space exploration. The major difference will be that the time that it takes to go from an innovation to an antique will be much shorter. Ten years from now the computer applications described in this monograph will probably seem antiquated in comparison with newer systems.

One factor likely to remain stable is the implementation process. No matter how sophisticated we become in our development of computer hardware and

software, the process of change is strongly influenced by a few basic dynamics. People provide more support and express less resistance to innovations when they are involved in planning for change. Comprehensive training experiences help to provide staff members with the competencies needed to make effective use of computer resources. Periodic evaluations and refinements of the total program of services, including computer applications, help to ensure that the changing needs of clients are met.

It seems clear that while technology will continue to change, the dynamics of implementing technology in counseling and student development services will progress along established lines. The literature in our field provides evidence that the quality of the implementation process has a direct impact on the effectiveness of computer applications. Our past experience appears to be a viable guide to an uncertain but hopeful future.

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APPENDIX

Suggested Ethical Principles for the Use of Computer Assisted Counseling, Testing, and Guidance Systems

1. Ensure that confidential data maintained on a computer are limited to information that is appropriate and necessary for the services being provided.

2. Ensure that confidential data maintained on a computer are destroyed after it is determined that the information is no longer of any value in providing services.

3. Ensure that confidential data maintained on a computer are accurate and complete.

4. Ensure that access to confidential data is restricted to appropriate professionals by using the best computer security methods available ("appropriate professionals" are described in existing ethical standards).

5. Ensure that it is not possible to identify with any particular individual, confidential data maintained in a computerized data bank that is accessible through a computer network.

6. Ensure that research participation release forms are completed by any individual who has automatically collected individually identifiable data as a result of using a computer assisted counseling, testing or guidance system.

7. Ensure that computer-controlled test scoring equipment and programs function properly thereby providing individuals with accurate test results.

8. Ensure that generalized interpretations of test results presented by microcomputer-controlled audiovisual devices accurately reflect the intention of the test author.

9. Ensure that a client's needs are assessed to determine if using a particular system is appropriate before using a computer assisted counseling, testing, or guidance system.

10. Ensure that an introduction to using a computer assisted counseling, testing, and guidance system is available to reduce possible anxiety concerning the system, misconceptions about the role of the computer, and misunderstandings about basic concepts or the operation of the system.

11. Ensure that a follow-up activity to using a computer assisted counseling, testing, and guidance system is available to correct possible misconceptions, misunderstandings, or inappropriate use as well as assess subsequent needs of the client.

12. Ensure that the information contained in a computer assisted career counseling and guidance system is accurate and up to date.

13. Ensure that the equipment and programs used in a computer assisted counseling, testing and guidance system function properly.

Determining the need for counselor intervention depends on the likelihood that the client might experience difficulties that would in turn limit the effectiveness of the system or otherwise exacerbate the client's problem. It is the counselor's responsibility to decide whether the best approach to avoiding such problems is direct intervention or indirect intervention through the use of workbooks, self-help guides, or other exercises. In general, academic counseling systems and career guidance systems that primarily provide information can be used effectively with less direct counselor intervention than personal counseling, testing, and assessment systems or career guidance systems that provide assessment and guidance functions. In spite of the fact that some academic and career systems may need less direct counselor intervention, the individuals who use these systems can still benefit from direct intervention when counselors are available.

Note: From "Ethical Issues Involved with the Use of a Computer Assisted Counseling, Testing, and Guidance Systems" by J. P. Sampson, Jr. and K. R. Pyle, 1983, Personnel and Guidance Journal, 61(5), 283-289. Copyright 1983 by the American Personnel and Guidance Association.